

TAXONOMIC NOTES ON CERTAIN TAXA OF ASIATIC FERNS

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During my studies on the Indian ferns (see Panigrahi, 1975, a, b, c) some of the results obtained on the taxonomy, identity and nomenclature of a few more taxa are published here for practical reasons prior to an extensive account on all the species investigated. The types mentioned have been studied except where indicated to the contrary.

DIPLAZIUM

1. DIPLAZIUM FIELDINGIANUM (Kunze) Panigrahi, comb. nov.

Allantodia fieldingiana Kunze in Linnaea 24:268 (1851). Syntype:

" Emodi monti" (Himalaya), Fielding s.n. (chosen here as lectotype, G, photos CAL, K).

Synonyms: Asplenium polymorphum Wall. Cat. no. 230 (1828), nom. nud.,

Diplazium polymorphum Presl, Tent. Pterid.: 114 (1836), nom. nud.,

Gymnogramma opaca Kunze in Linnaea 24:263 (1851), in synonym., nom

nud.; Asplenium fieldingianum (kunze) Moore, Ind. Fil. 2:43 (1857);

A. polymorphum Wall. ex Mett. in Farnagattungen 6, Asplenium: 192

(1859), nomen superfl. for Allantodia fieldingiana Kunze (1851)

cited as a direct nomenclatural synonym; Athyrium fieldingianum

(Kunze) Milde in Bot. Zeit. 28:370 (1870); C. Chr., Ind. Fil.: 42 (1905);

Asplenium polypodioides auctt.; Clarke in Trans. Linn. Soc. London,

Ser. 2, Bot. 1:511 (1880) pro parte, quoad A. polymorphum Wall. Cat.

No. 230 pro parte.; Asplenium (Diplazium) latifolium D. Don var.

var. polymorpha (Wall. ex Mett.) Hope in Journ. Asiatic Soc. Beng.

57:307, t. 17 (1888); Diplazium polypodioides Blume var. sinense

Christ in Bull. Acad. Intern. Geog. Bot. 16:127 (1906). Type: China,

Ht. Onei, The Putschou Yeranfu, 5366. (alt. ?), Warburg s.n. (not seen).

Rhizome creeping and covered with black-marined scales; fronds 60 cm to 8 m long; stipe 30 cm to 1 m long, + 1 cm thick at base, smooth, convex and obtuse below, angled and grooved above, the ridges becoming winged and closing upwards; stipe and rachis straw-coloured on the lower surface but brown above when dry, sparsely scaly; scales 4 mm long x 0.25-0.5 mm broad at base and terminating in a subulate tip, brownish to transparent, deciduous. Lamina 40-80 cm long, subcoriaceous to coriaceous, rigid, ovate, bipinnate to tripinnatifid; primary pinnae upto 15, subopposite or even alternate, successive ones 3.5 to 9 cm apart from each other, widely spreading, upto 30 cm long x 9-11 cm broad, with a stalk 1-2 cm long; thickened at base, decurrent, unequally oblong and acute; secondary pinnae upto 18 pairs, subopposite at the basal half and + alternate upwards, shortly decurrent on short

(1-2 mm) stalks, divergent, oblong, acuminate, 4.5-7.5 cm long x 1.4-2 cm broad at the middle, pinnae 5/7 cut towards costa, broadly truncate or subcordate; pinnae with 6-10 short and decussate lobes and terminating in an attenuate serrate apex, lobes rectangular with an obtuse subspinulose apex; margin grossly crenate-serrate and reflexed (when dry); costa winged on the upper surface, costa and costules flexuose, raised and lined by bluish-black margins on the upper surface, the latter glabrous; the lower surface glabrescent with short whitish hairs on the veins only and with capitate glands on the lamina; costules and veins prominently oblique, 5-8 pairs of veins pinnately arising from the costule and generally fork once half-way the margin and terminating usually in 'hydathodes'. Sori dark brown, 3-4 on each side of and nearer to costule, distal veins without sori; indusium membranous, margin lacinate (but many sori without a visible indusium). Spores + reniforme with a thin perispore and minutely rugose, 46 μ m x 31 μ m.

Distribution: China (West), Pakistan, India (Himachal Pradesh and Uttar Pradesh), Nepal & Bhutan.

Kunze (1851) observed that Schmid 7, by inference from the Nilgherries, was an incomplete specimen, about 1.5 ft long and 1 foot broad without the base and the apex and the lower primary pinnae petiolate, often 1-1.1 ft long. I have not seen this specimen, nor any other from the South India, which exactly matches Fielding s.n. from the Himalayas or any of the numerous specimens examined by me at BM and at K. It is, therefore, reasonable to refer Schmid 7 to Diplazium polypodioides Bl. with which this Himalayan species as also Diplazium frondosum J.Sm. nom. nud. have long been confused.

Although I have not seen the 'type' of Diplazium polypodioides Bl. var. sinense Christ, Wilson 5366 (identified with his var. by Christ himself) and Tang 2578 from Mt. Omei in the Western China, the type locality, both studied at Kew, match very well with Fielding s.n. from the Himalayas. Wilson 5366 from China and Stainton, Sykes & Williams 3659(bis) from Nepal (BM) show up a distinct creeping rhizome, up to 4 cm long.

2. DIPLAZIUM FRONDOSUM (Clarke) Christ in Not. Syst. Lecoq 1: 46 (1909).

Asplenium latifolium D. Don var. frondosa Clarke in Trans. Linn. Soc. London, Ser. 2, Bot. 1: 503 (1880); Blanford in Journ. Asiatic Soc. Beng. 57: 307, t. 18 (1888). Type: Nepal, 1820, Wallich 230 (labelled Asplenium polymorphum Wall. delete Asplenium decussatum et marginatum substitute Asplenium frondosum Wall.) (F. & A.L.).

Synonyms: Asplenium frondosum Wall. Cat. No. 230 (1829) pro parte, nom. nud.; non Pittingsh (1864); Diplazium frondosum J.Sm. in Journ. Bot. 3: 408 (1841) et 4: 172 (1842) nom. nud., Moore, Ind. Fil: 133 (1857), nom. nud.

Distribution: China, Pakistan, India (Northern & Eastern), Nepal and Sikkim.

Clarke (1880:503) was the first to describe Asplenium frondosum Wall. (1829) nom. nud. as a variety of Asplenium latifolium D. Don. His description was brief: ["involucres very early disappearing, the plant frequently supposed a Gymnogramme; cutting slightly but invariably unlike the typical A. dilatatum"], and he remarked, "This is the real A. frondosum Wall. type, which he afterwards arranged as a variety of Asplenium polymorphum Wall. Cat. 230. The sori are often shorter and straight and become very thick, almost covering the segments in full fruit". Blanford (1888:307, t. 18) listed "Asplenium latifolium var. frondosa Wall. sp." without any description or reference to Clarke (1880), but illustrated it by the Plate XVII, which depicts a full frond with a stipe scaly at base and with segments of the secondary pinnas showing the venation and the arrangement of sori, which are sufficiently diagnostic of the species. Beddome (1883, 1892), however, seems to have overlooked this variety, var. frondosa Clarke although he (1883:186) referred to Clarke's (1880) varieties viz. var. vestita, var. sublatifolia and var. effusior etc. Diplazium frondosum J. Sm. (1841, 1842) and Moore (1857) based on Asplenium frondosum Wall. Cat. No. 230 (1829), (without any description until Clarke, 1880) is illegitimate. However, Christ (1909) validated the epithet frondosum Wall. at the species rank with Diplazium by citing Asplenium latifolium var. frondosa Blanford in Journ. Asiat. Beng. 57:307, t. 18 (1888) as a direct nomenclatural synonym, although he should have referred to Clarke (1880), an earlier publication based on the same type viz. Wallich 230 from Nepal.

Christ (1909) was, however, wrong in observing that Diplazium flaccidum Christ in Bull. Acad. Intern. Geogr. Bot. 16:125 (1906) based on a different type viz. Wilson 5347 from Mont. Omei, in China is conspecific with D. frondosum J. Sm. ex Christ (1909) based on Wallich 230 from Nepal. D. flaccidum Christ, as the name suggests, has a flaccid sub-coriaceous texture, and is characterised by a thick rhizome, 5 cm in diam., frond much larger with a deeply sulcate stipe 70 cm long and lamina with 28 pairs of pinnae, the lowest primary pinnae 60 cm long x 20 cm broad, sec. pinna 11 cm long x 2 cm broad, ultimate segments 1 cm long x 7 mm broad, veins c. 8 pairs, furcate in the middle and sori 5 mm long. D. frondosum Christ, on the other hand, has a short-creeping rhizome or root-stalk with the frond stuffed, stipe 24-55 cm long, lamina with 10-12 pairs of pinnae, texture herbaceous but firm, the lowest primary pinnae 16-40 cm long x 3-14 cm broad, secondary pinnae 4-8 cm long x 1.8-2 cm broad, ultimate segments 6-7 mm long x 4-5 mm broad, veins 4-5 pairs, generally simple, occasionally forked and sori 3.5 mm long x 1 mm broad. Therefore, D. frondosum (Clarke) Christ and D. flaccidum Christ (1906), in my opinion, are two distinct species. Had the latter name been cited by Christ as a direct nomenclatural synonym or included within the

circumscription of the former, D. frondosum (Clarke) Christ would have been a superfluous name for D. flaccidum Christ (1906). That, however, Christ did not do; he had merely expressed an opinion that D. flaccidum may be suppressed in favour of D. frondosum. Christensen, (1931:304) in the circumstances, not merely committed a taxonomic error in citing D. frondosum Christ as a synonym of D. flaccidum Christ but he was also mistaken in stating that "no species has been described under this name". D. frondosum (Clarke) Christ was validated by reference to Blanford (1888, t. 18), cf. article 44 of the International Code Botanical Nomenclature, 1972].

Asplenium frondosum Ettingsh. in Denkschr. Ak. Wien. 23:85 (1864) is conspecific with Diplazium polypodioides Blume, Enum. Pl. Jav. ii: (;94 (1828) . cf. also Christensen, Ind. Fil.:112 (1905)].

/ 3. DIPLAZIUM HIMALAYENSE (Ching) Panigrahi, comb. nov.
Allantodia himalayensis Ching in Acta Phytotax. Sin. 9:
 55 (1964). Type: As for Asplenium polypodioides Mett.
 var. vestita Clarke (1880).

Synonyms: Asplenium polypodioides Mett. var. vestita (Clarke) in Trans. Linn. Soc. London, Ser. 2, Bot. 1:501 (1880). Syntypes: "This variety seemed to be confined to the Central Himalayas; a large form", India, Darjeeling, Rungbee, 1777 m, 17 Aug. 1869, Clarke 8646 & 8646 C(i); Darjeeling, 1980 m, 2 Sept. 1873, Clarke 27329 A(f); Sikkim, subtrop., 305 m, Hooker s.n. (K). Cf these, Hooker s.n. with a part of the densely scaly stipe and two primary pinnae displaying both the glabrous upper and the fertile lower surfaces, is selected by me here as lectotype. Morton's (1974) selection of "Darjeeling, 6500 feet alt., June 19, 1884, Clarke 3532 D(K) as the lectotype overlooks the fact that this specimen was collected by Clarke in 1884 after the publication of his variety in 1880]; Diplazium polypodioides var. vestita (Clarke) C. Chr. in Contrib. U.S. Nat. Herb. 25:304 (1931); non D. vestitum Presl (1849); D. axillare Ching in Lignan Sc. Journ. 15:277 (1936) pro parte, quoad synon D. polypodioides var. vestita (Clarke) C. Chr. tantum; D. maximum (D. Don) C. Chr. var. vestitum (C. B. Clarke) Morton in Contrib. U.S. Nation. Herb. 38(7):302 (1974).

Distribution: India (North & Eastern). Sikkim.

I agree with Ching (1964) that Clarke's (1880) var. vestita deserves a species rank but transfer it to the genus Diplazium, as above. Morton's (1974) proposal to treat it as a variety of Diplazium maximum D. Don (1825), whose type is no where traceable, and which is treated in herbaria as a species of uncertain identity, does not appear to me reasonable.

4. DIPLAZIUM HIMALAYENSE var. EFFUSIOR (Clarke)

Panigrahi, comb. nov.

Asplenium polypodioides (Bl.) Mett. var. effusior Clarke in Trans. Linn. Soc. London, Ser. 2, Bot. 1:501 (1880). Syntypes: Sikkim,

Jerdon s.n. [12](K), selected here by me as lectotype.

Synonym: Diplazium umbrosum (Ait.) Bedd. var. multicaudatum (Bedd.)

Bedd., Handb. Ferns Brit. India, Ceylon & Malay Penins.: 186 (1883) pro parte, quoad var. effusior Clarke synonym tantum; non Asplenium multicaudatum (Baker) Clarke (1880).

Asplenium polypodioides (Bl.) Mett. var. effusior Clarke characterised by "segments of the secondary pinnae larger, pinnatifid, hence the veins in them subpinnated, sori not in two rows but often long" is based on two syntypes. Of these, Jerdon [12] from Sikkim has non-paleaceous stipe, rhachis and costae; lamina greenish-herbaceous in texture, shining and glabrous on both surfaces; Hooker s.n. from East Nepal (Mai valley), on the other hand, has (a) the stipe, primary rhachis and costae + densely paleaceous with brownish incrustation (which, in fact, simpler scales of varying sizes and shapes) on the stipe, (b) lamina thicker, dirty brown and tomentose, (c) the scales uniformly brown with toothed margins without black borders. It may, therefore, serve as an intergrading form between var. himalayense and var. effusior.

Beddome (1883:186) refers Asplenium polypodioides var. effusior Clarke to Diplazium umbrosum (Ait.) Bedd. var. multicaudatum (Bedd.) Bedd.). But the latter has a creeping rhizome, glabrous fronds, secondary pinnae often caudate and pinnatifid nearly to the rhachis, sori oblong or subquadrate near the rhachis and is now treated as a synonym of Diplazium spectabile (Wall. ex Mett.) Ching.

Distribution: Nepal, Sikkim. Apart from the syntypes, I have seen no other specimen to refer to this variety, although I have examined several collections in the BM and K to represent var. himalayense.

5. DIPLAZIUM PSEUDOSYLVAICUM Panigrahi, nom. nov.

Allantodia sylvatica Blume, Enum. Pl. Jav. 2: 173 (1828). Type: in sylvis montis Buranagrang, Javae, Blume s.n. (holotypes-L; isotypes-K); non Diplazium sylvaticum (Bory) Sw. (1806).

Synonyms: Asplenium silvaticum (Bl.) Moore, Ind. Fil. 2: 43 (1857); non (Bory) Presl (1825); Athyrium silvaticum (Bl.) Milde in Bot. Zeit. 24: 376 (1866) et 28: 354 (1870) under "a - Euathyrium"; non Milde l.c. 28: 354 (1870) under "d - Diplazium".

Rhizome and stipe not seen; fronds bipinnate-tripinnatifid, glossy green, membranaceous in texture and glabrous on the upper surface; primary rhachis 40 cm long x 15 cm broad with 14-15 alternate pinnae on each side, lanceolate and terminating in a deeply-lobed inconspicuous terminal pinna, + 5 cm long; secondary pinnae lanceolate, acuminate, the lowermost ones 7-9 cm long x 2.2-2.5 cm broad, sessile (stalk 1.5 mm long) and decurrent, deeply pinnatifid (13/14 th) almost to the costa; costae and costules on the lower surface sparsely paleaceous, the palea of varying sizes, uniformly brown and thin-walled;

ultimate segments 11-14 mm long, broader (6 mm) at the upper half than (4-5 mm) at the lower-half, oblong, obtuse, margin as also apex equally serrated, lower surface shining with sessile whitish glands; veins 5-6 pairs on each side of the costule, all forked, often the four lower veins twice-forked; sori c.1 mm long, in two rows, situated on the acroscopic branch, almost adjacent to the costule; indusia persistent; spores reniform, smooth with a very thin perispore, 45 μ m x 25 μ m.

Holtum (1968), in disagreement with Copeland (1908), treated Brachy-sorus woodwardioides Presl (1851) based on Cuming 153 from Luzon as a species distinct from Allantodia sylvatica Blume (1828) based on Blume s.n. from Java. I have examined the type/isotype of both the species at K and agree with him. Diplazium woodwardioides (Pr.) Holtum is a smaller fern with secondary pinnae 7 cm long x 1.6 cm broad, darker and subcoriaceous in texture and + glabrescent whereas D. pseudo-sylvaticum nom. nov. (= Allantodia sylvatica Bl.) is a relatively larger fern, greenish-herbaceous in texture with costae and costules sparsely paleaceous with thin brown scales with entire margin and provided with shining whitish sessile glands on the lower surface of lamina, otherwise glabrous.

Diplazium sylvaticum (Bory) Sw. based on Callioteris sylvatica Bory (1804) from Mauritius is at once distinguished from D. pseudo-sylvaticum by its simply-pinnate fronds with pinnae entire or shallowly lobed, dark scales with toothed margin, 3-4 pairs of unbranched veins and sori 3-5 mm long.

Distribution: Java. Apart from the isotype, I have seen no other specimen from Asia at the BM or K.

TRICHOMANES L.

6. TRICHOMANES GRIFFITHII (v.d. Bosch) Panigrahi, comb. nov.

Didymoglossum griffithii v.d. Bosch in Ned. Kr. Arch. 5(3): 141 (1863).

Type: India Orientalis: Burnaj, "ergui, Griffith s.n. (K, 2 sheets), photo (BM).

Distribution: Burma and India. Specimens, other than the types, examined: INDIA. Andaman Islands: South Andamans, East Coast, Salt Factory, 20 Sept. 1890, King s.n. (K); South Andamans, Kurz s.n. (K).

7. TRICHOMANES EUPHLEBIUM (v.d. Bosch) Panigrahi, comb. nov.

Didymoglossum euphlebiium v.d. Bosch in Ned. Kr. Arch. 5(3): 142 (1863).

Type: India Orientalis (Assam): "ishmeel, Griffith s.n. (K, 2 sheets, photo, BM).

Distribution: India, Sikkim & Bhutan. Specimens, other than the types, examined: India. West Bengal: Darjeeling, 610 m, May, 1880, Gamble 8080 (K); Himalaya, Jhulung rocks, Hooker s.n. (K). Meghalaya: Cherra-

punji, Mumluk, 27 Aug. 1835, Griffith s.n. (K); Khasya, Surrareem, Clarke 45579 (K). Sikkim Himalays, Anon (comm. Junförd in 1870) (K). Bhutan, Eastern, Satsalor, 750 m, 14 Nov. 1935, Ludlow, Sheriff & Taylor 7287 (B.M.).

The specimens cited above, including the types, were annotated by late A.H.G. Alston in Aug. 1955 as Trichomanes griffithi (v.d. Bosch) Alston and T. euphlebioides (v.d. Bosch) Alston, respectively but these proposed combinations on herbarium sheets do not seem to have been published. I have studied these two species vis-a-vis T. denticatum (v.d. Bosch) Bedd. (= T. campanulatum Roxb. (1844), see Morton, 1974) and T. bipunctatum Por. with which they may be confused and consider them distinct.

ASPLENIUM L.

8. ASPLENIUM TETRAPLOIDEUM Panigrahi, nom. nov.

Asplenium furcatum Thunb. var. tripinnatum Baker in Hook. et Bak., Syn. Fil.: 437 (1874); Sim, Ferns of South Africa: 154, t. 80 (1892), pro parte. Syntype: Natal, received February, 1867, McKen 281 (K, selected here by me as lectotype).

Synonyms: A. tripinnatum (Baker) Panigrahi in Proc. Nat. Inst. Sc. India 29(B); 394, figs 1(a), 2(a, d, g, J), fig. 4, table II (1963), nomen illegit. non. Roxb. (1844).

Rhizome suberect; fronds tufted, tripinnatifid, 45-75 cm long, 12-22 cm broad, the lower pinnae somewhat reduced vis-a-vis the middle pinnae; stipe 15-22 cm long, slightly fibrillose, rhachis and under surface of pinnae + fibrillose, upper surface glabrous; scales sparse, small, broader at base, slowly tapering to a toothed midrib, orange brown in colour; pinnae deltoid, shortly stalked, pinnately cut to the costae into 5-7 cuneate or flabellate 3-lobed and toothed segments; spores reniform, $40.1 \mu\text{m} \times 21 \mu\text{m}$.

$n = 72$ (tetraploid). It forms 6n F₁ sterile hybrid when crossed with the 8n (octoploid) form of Asplenium aethiopicum (Burm.) Becherer from Kenya, the hybrid producing 72 bivalents and 72 univalents and bad spores.

The octoploid form from Kenya is + of the same dimension as the tetraploid species from Kenya but with much less toothed pinnules than those of the tetraploid, the stipe and rhachis more scaly, the pinnae are almost sessile or slightly stalked, lanceolate and narrower, the lower pinnae not or hardly reduced than those above and the subsequent ones gradually reduced from base to apex (see Panigrahi, 1963, fig. 1 b, 2b, e, i k); scales on the stipe and rhachis are many celled broad at the base and gradually taper to an end; the cells are isodiametric and dentate at the margin; spores ovoid, $42.6 \mu\text{m} \times 29.8 \mu\text{m}$. The two other syntypes of var. tripinnatum Baker from Natal (K) match with the octoploid form in morphology.

All efforts to cross the tetraploid with the 12-ploid form

of *Asplenium aethiopicum* (Burm.) Bech. from Madeira ($n=216$, see Panigrahi, 1963) failed, whereas the octoploid form from Kenya formed $10n F_1$ hybrid with the Madeira plant and produced c.108 bivalents and 144 univalents and bad spores.

ALSOPHILA R.Br.

9. *ALSOPHILA WALKERAE* (Hook.) J.Sm. var. *TRIPINNATA* (Hook. & Bak.)

Panigrahi, comb. nov.

Hemitelia (Anphic.) *walkerae* (Hook.) Presl var. *tripinnata* Hook. & Bak.

Syn. Fil.: 31 (1865). Type: Sri Lanka (Ceylon), Thwaites s.n.

(C.P. 1398 pro parte) (K-2 sheets, B!).

Cytheae walkerae (Hook.) var. *tripinnata* (Hook. & Bak.) Holttum in New Bull. 19: 453 (1965).

Distribution: Sri Lanka.

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